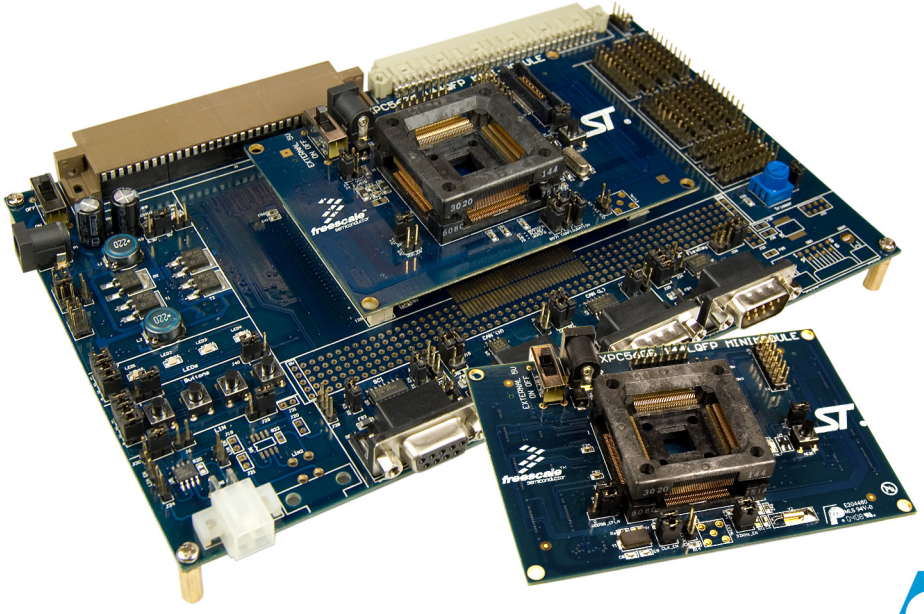
SPC560Bx EVB User Manual



SPC560BXEVBUM
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1 OVERVIEW

The SPC560Bx EVB is an evaluation system supporting STMicroelectronics SPC560Bx microprocessors. The complete system consists of an SPC56XXMB Motherboard and an SPC560BxADPT Mini-Module which plugs into the motherboard. Different Mini-Modules are available for evaluating devices with different footprints in the SPC560Bx family of microprocessors. The evaluation system allows full access to the CPU, all of the CPU's I/O signals, and the motherboard peripherals (such as CAN, SCI, LIN). The Mini-Module may be used as a stand-alone unit, which allows access to the CPU, but no access to the I/O pins or any motherboard peripherals.

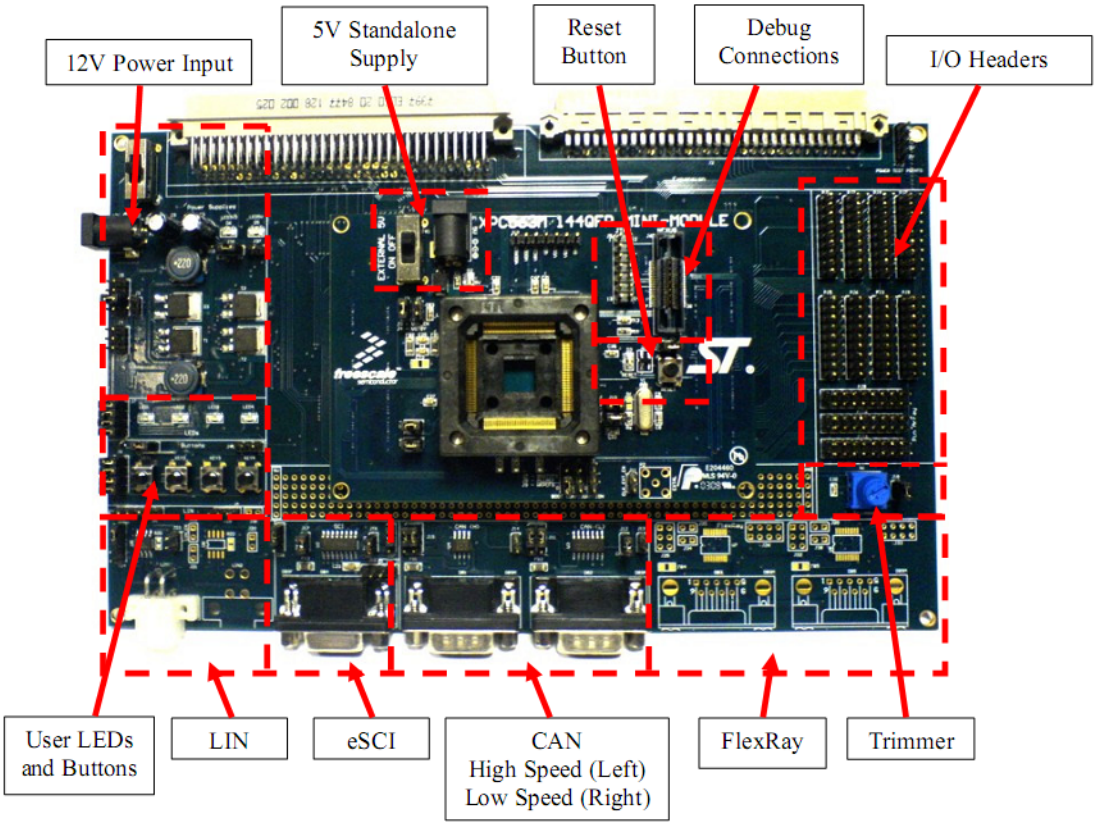

Figure 1-1: Overview of the SPC560Bx EVB

1.1 Package Contents

An SPC560Bx Evaluation Kit includes the following items:

- One SPC56XXMB Motherboard
- One SPC560BxADPT100S or SPC560BxADPT144S or SPC560BxADPT208S Mini-Module
- One SPC56XX Resources CD-ROM
- One P&E USB-ML-PPCNEXUS Hardware Interface Cable
- One USB A-to-B Cable
- STMicroelectronics Warranty Card

An SPC560Bx Adapter Package includes the following items:

- One SPC560BxADPT100S or SPC560BxADPT144S or SPC560BxADPT208S Mini-Module
- One SPC56XX Resources CD-ROM
- STMicroelectronics Warranty Card

1.2 Supported Devices

The SPC560BxADPT100S Mini-Module supports the following devices:

- SPC560BxxL3 (100LQFP)

The SPC560BxADPT144S Mini-Module supports the following devices:

- SPC560BxxL5 (144LQFP)

The SPC560BxADPT208S Mini-Module supports the following devices:

- SPC560BxxB2 (208BGA)

1.3 Recommended Materials

- STMicroelectronics MPC5604B reference manual and datasheet
- SPC56XXMB schematic
- SPC560BxADPT100S schematic
- SPC560BxADPT144S schematic
- SPC560BxADPT208S schematic

1.4 Handling Precautions

Please take care to handle the package contents in a manner such as to prevent electrostatic discharge.

2 HARDWARE FEATURES

The SPC560Bx EVB is an evaluation system for STMicroelectronics' SPC560Bx microprocessors. A 38-pin Mictor Nexus port and/or a 14-pin JTAG port are provided on the Mini-Module to allow usage of an external PowerPC Nexus interface such as P&E USB-ML-PPCNEXUS cable and Cyclone MAX automated programmer.

2.1 SPC56XXMB Board Features

- ON/OFF Power Switch w/ LED indicators
- A 12VDC power supply input barrel connector
- Onboard ST Microelectronics L9758 regulator provides three different power voltages simultaneously: 5V, 3.3V, and 1.2V
- Onboard peripherals can be configured to operate at 5V or 3.3V logic levels
- Two CAN channels with jumper enables
  - One CAN channel with High-Speed transceiver and DB9 male connector
  - One CAN channel with Low-Speed Fault Tolerant and High-Speed transceiver (selectable with jumpers) and DB9 male connector
- Two LIN channels with jumper enables
  - One channel with transceiver and pin header connector populated
  - One channel with footprints only
- One SCI channel with jumper enables
  - Transceiver with DB9 female connector
- Two FlexRay channels with jumper enables

- One channel with transceiver and DB9 male connector
- One channel with footprint only

- Four user push buttons with jumper enables and polarity selection
- Four user LED's with jumper enables
- One potentiometer for analog voltage input
- Pin array for accessing all I/O signals
- Expansion connectors for accessing all I/O signals
- Development zone with 0.1" spacing and SOIC footprint prototyping
- Specifications:
  - Board Size 5.5" x 9.0"
  - 12VDC Center Positive power supply with 2.5/5.5mm barrel connector

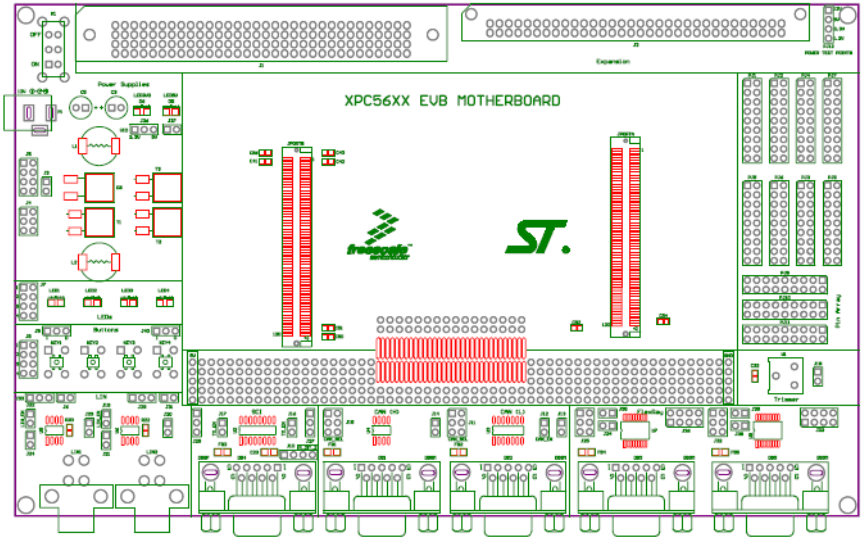

Figure 2-1: SPC56XXMB Top Component Placement

2.2 SPC560BxADPT Mini-Module Board Features

- Can be used as a stand-alone board by providing external 5V power

supply input

- ON/OFF Power Switch w/ LED indicator
- Reset button with filter and LED indicator
- SPC560BxADPT100S has socket for SPC560Bx in 100LQFP footprint
- SPC560BxADPT144S has socket for SPC560Bx in 144LQFP footprint
- SPC560BxADPT208S has socket for SPC560Bx in 208BGA footprint
- Debug ports: 38-pin Mictor Nexus port and/or 14-pin JTAG port
- Direct clock input through SMA connector (footprint only)
- Jumpers for boot configuration

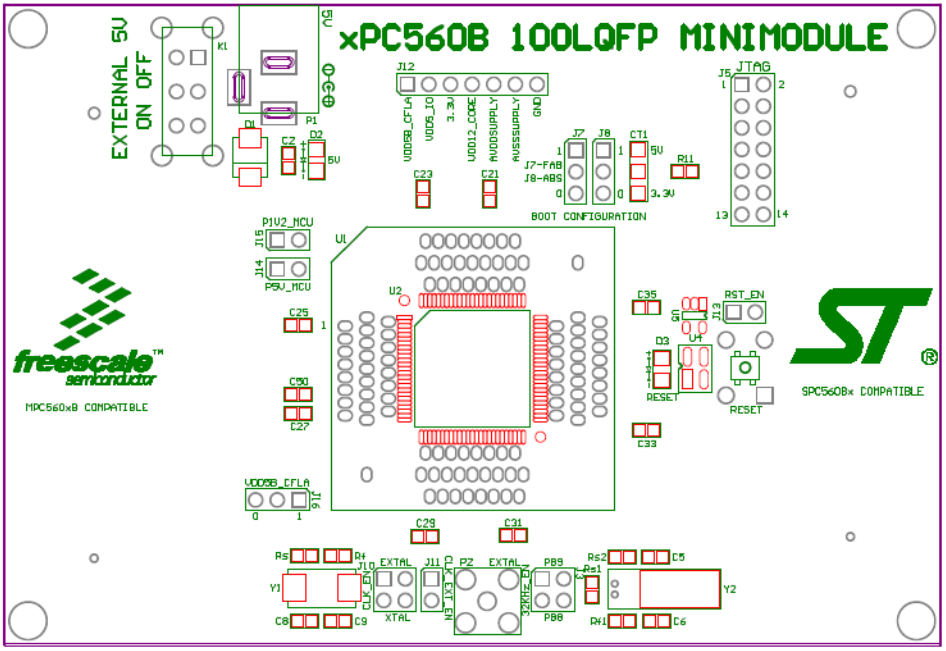

Figure 2-2: xPC560PT100S Top Component Placement

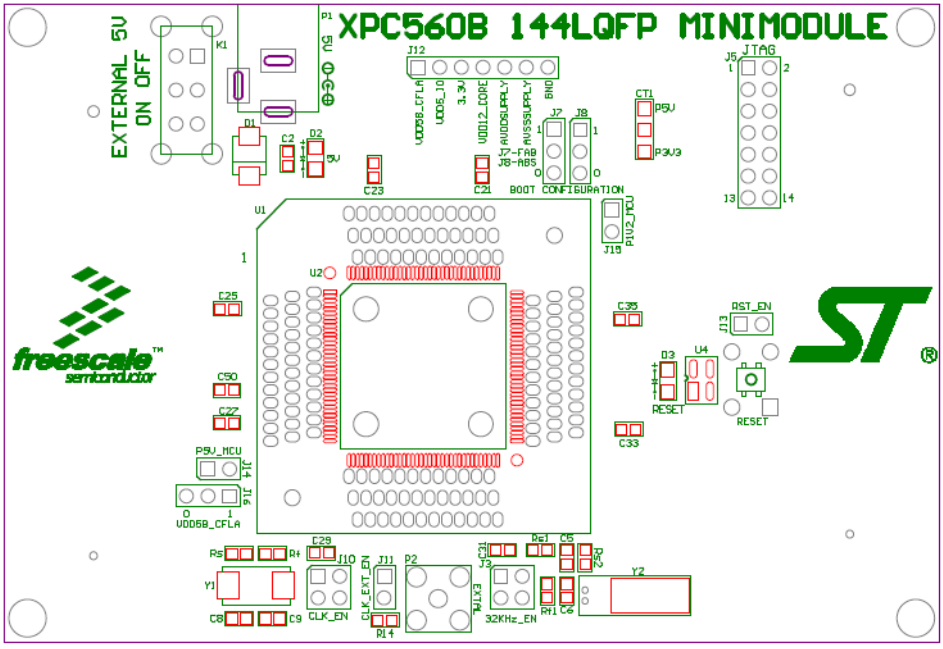

Figure 2-3: SPC560BxADPT144S Top Component Placement

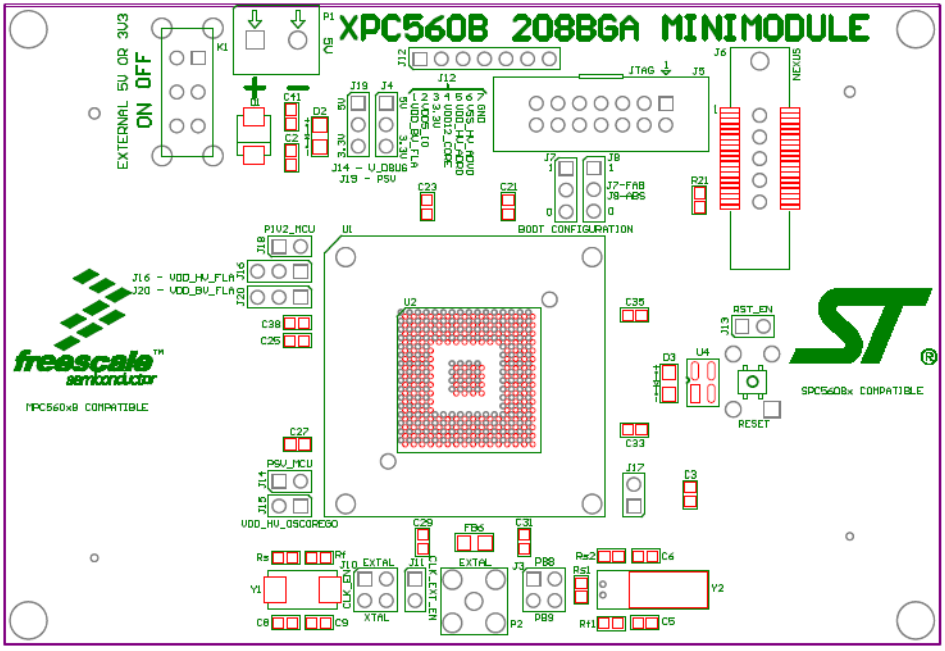

Figure 2-4: SPC560BxADPT208BGA Top Component Placement

2.3 Pin Numbering for Jumpers

Jumpers for both the SPC56XXMB motherboard and the SPC560Bx Mini-Modules have a rounded corner to indicate the position of pin 1. See examples below for the numbering convention used in this manual for jumper settings.

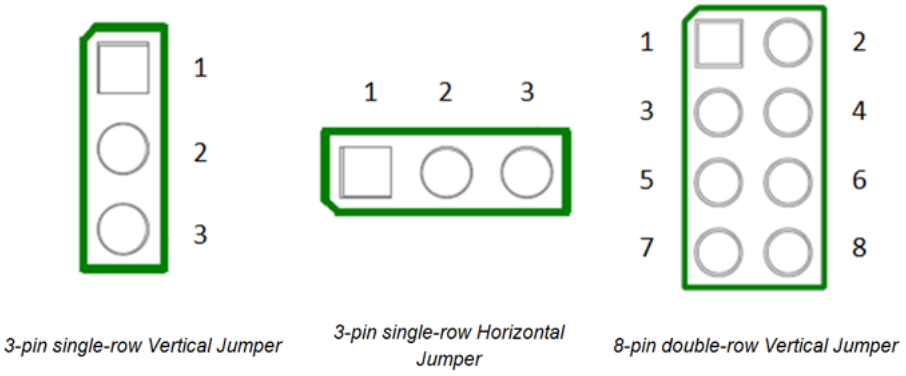

Figure 2-5: Pin Numbering

3 SPC56XXMB HARDWARE & JUMPER SETTINGS

3.1 Power Supplies

The SPC56XXMB obtains its power from the 12VDC Center Positive input barrel connector. The following jumpers are used to configure the power supply output:

J3 – VSA Tracking Regulator Configuration

Jumper Setting	Effect
On	The ST L9758 tracking regulator VSA tracks the input voltage at its TRACK_REF pin.
Off (default)	The ST L9758 tracking regulator VSA tracks 5V

J4 – VPROG Regulators Control

Jumper Setting	Position	Effect
1+2	On	V_{KAM} regulator output is programmed to 1V
	Off (default)	V_{KAM} regulator output is programmed to 1.5V
3+4	On	V_{STBY} regulator output is programmed to 2.6V
	Off (default)	V_{STBY} regulator output is programmed to 3.3V

5+6	On	V_{DLL} regulator output is programmed to 2.6V
	Off (default)	V_{DLL} regulator output is programmed to 3.3V

J5 – Regulators Enable & Standby

Jumper Setting	Position	Effect
1+2	On	The power regulator is always on
	Off (default)	The power regulator is in standby if jumpers 5+6 are also in the “off” position
3+4	On	VSB, VSC, and VSD tracking regulators are disabled
	Off (default)	VSB, VSC, and VSD tracking regulators are enabled
5+6	On (default)	The power regulator is always on
	Off	The power regulator is in standby if jumpers 1+2 are also in the “off” position
7+8	On	V_{DLL} and V_{CORE} regulators are disabled
	Off (default)	V_{DLL} and V_{CORE} regulators are enabled

J36 – VIO Peripherals Logic Level

Jumper Setting	Effect
1+2	Onboard peripherals are configured for 3.3V logic
2+3 (default)	Onboard peripherals are configured for 5V logic

J37 – VBat low voltage detection

Jumper Setting	Effect
On	Low battery detection is enabled
Off (default)	Low battery detection is disabled

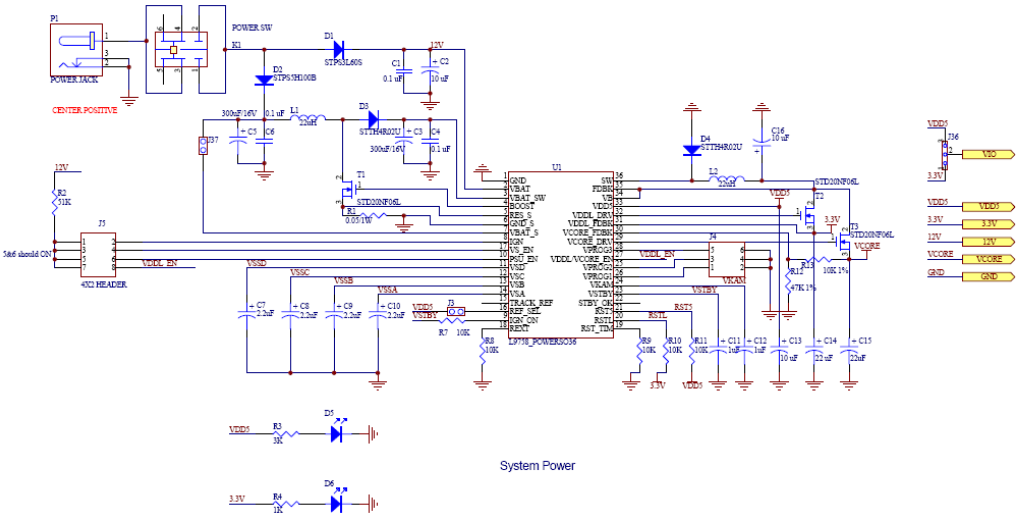

Figure 3-1: Power Supply circuitry schematic

3.2 LEDs

There are four user LEDs available on the SPC56XXMB. All LEDs are active low.

J7 – LEDs Enable

Controls whether the LEDs on the SPC56XXMB motherboard are connected to I/O pins of the processor. The jumpers can be removed and wires can be used to connect each LED to any processor I/O pin, if desired. Please note that although the schematics indicate that the processor I/O pins are eMIOSx, those are not the I/O pins for the SPC560Bx EVB. The table below has the correct pins listed.

Jumper Setting	Effect

1+2 (default on)	LED1 connected to PE4
3+4 (default on)	LED2 connected to PE5
5+6 (default on)	LED3 connected to PE6
7+8 (default on)	LED4 connected to PE7

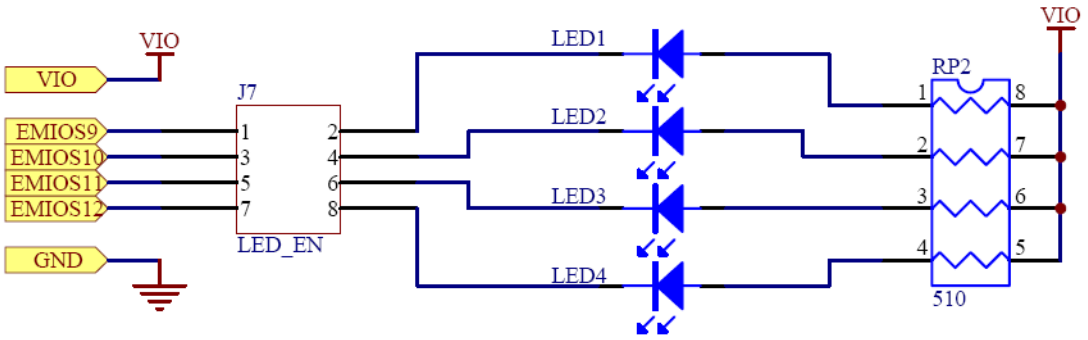

Figure 3-2: LEDs circuitry schematic

3.3 Buttons

There are four user buttons available on the SPC56XXMB.

J8 – Buttons Enable

Controls whether the buttons on the SPC56XXMB motherboard are connected to I/O pins of the processor. The jumpers can be removed and wires can be used to connect each button to any processor I/O pin, if desired. Please note that although the schematics indicate that the processor I/O pins are eMIOSx, those are not the I/O pins for the SPC560Bx EVB. The table below has the correct pins listed.

Jumper Setting	Effect
1+2 (default on)	KEY1 connected to PE0
3+4 (default on)	KEY2 connected to PE1
5+6 (default on)	KEY3 connected to PE2
7+8 (default on)	KEY4 connected to PE3

J9 – Buttons Driving Configuration

Selects whether the buttons drive logic high or drive logic low when pressed.

Jumper Setting	Effect
1+2	When pressed, buttons will send logic high to the connected I/O pin
2+3 (default)	When pressed, buttons will send logic low to the connected I/O pin

J40 – Buttons Idle Configuration

Selects whether the I/O pins are pulled logic high or pulled logic low. This controls the defaultlogic level of the I/O pins when the buttons are not pressed.

Jumper Setting	Effect
1+2 (default)	I/O pins connected to the buttons are pulled up to logic high
2+3	I/O pins connected to the buttons are pulled down to logic low

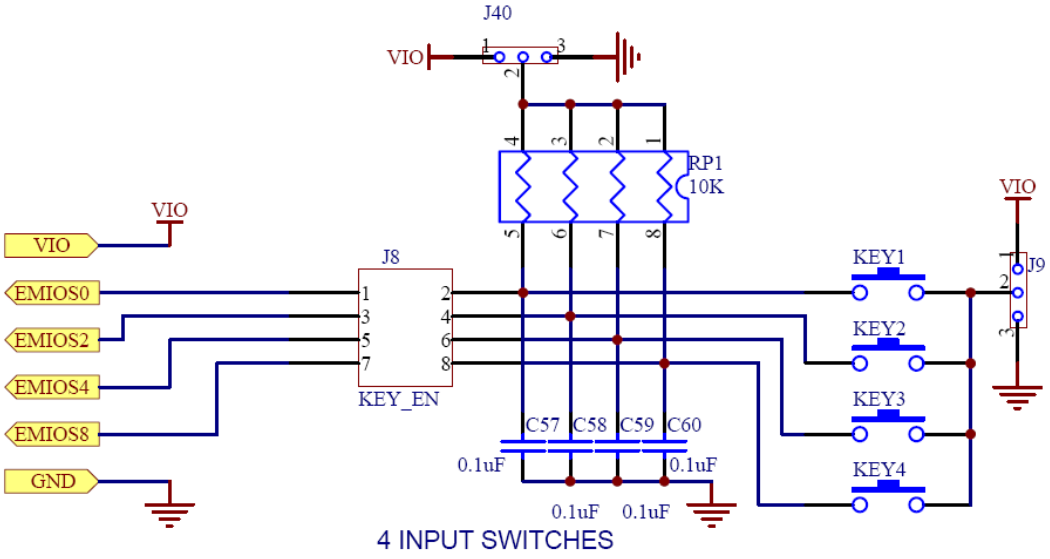

Figure 3-3: Buttons circuitry schematic

3.4 LIN

There are footprints for two LIN connections on the SPC56XXMB. By default,

one LIN circuit is assembled (LIN1) and the other circuit is left unpopulated (LIN2).

J6 – LIN1 pin2 configuration

Jumper Setting	Effect
On	Pin 2 of the LIN1 connector is connected to 12V
Off (default)	Pin 2 of the LIN1 connector is not connected to 12V

J22 – LIN1 enable

Jumper Setting	Effect
On (default)	Enables the LIN1 transceiver
Off	Disables the LIN1 transceiver

J23 – LIN1 master selection

Jumper Setting	Effect
On	LIN1 is configured as a master node
Off (default)	LIN1 is configured as a slave node

J24 – LIN1 pin1 configuration

Jumper Setting	Effect
On	Pin 1 of the LIN1 connector is connected to 12V
Off (default)	Pin 1 of the LIN1 connector is not connected to 12V

J27 – LIN1/SCI TxD selection

Controls whether the TxD pin on LIN1 or SCI is connected to the default I/O pin on the SPC560Bx processor.

Jumper Setting	Effect
1+2	The LIN1 TxD pin is connected to the “PB2” pin on the SPC560Bx processor. This should be set if enabling LIN1.
2+3	The SCI TxD pin is connected to the “PB2” pin on the SPC560Bx processor.

J28 – LIN1/SCI RxD selection

Controls whether the RxD pin on LIN1 or SCI is connected to the default I/O pin on the SPC560Bx processor.

Jumper Setting	Effect
1+2	The LIN1 RxD pin is connected to the “PB3” pin on the SPC560Bx processor. This should be set if enabling LIN1.

2+3	The SCI RxD pin is connected to the “PB3” pin on the SPC560Bx processor.

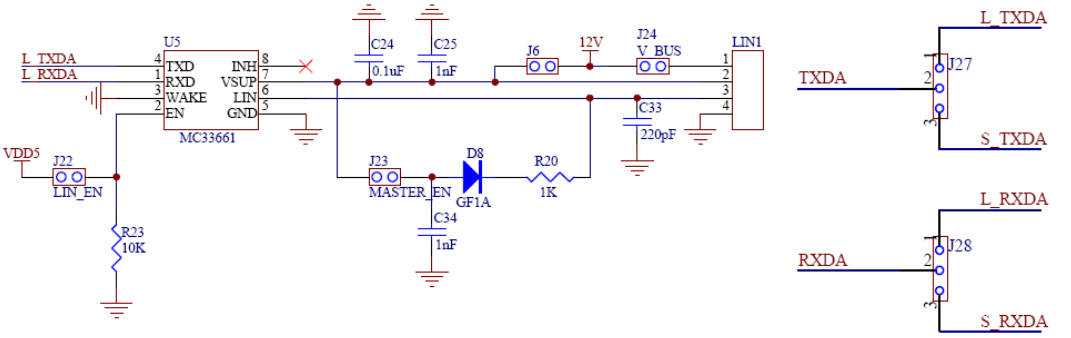

Figure 3-4: LIN1 Schematic

J31 – LIN2 pin2 configuration

Jumper Setting	Effect
On	Pin 2 of the LIN2 connector is connected to 12V
Off (default)	Pin 2 of the LIN2 connector is not connected to 12V

J19 – LIN2 enable

Jumper Setting	Effect
On	Enables the LIN2 transceiver
Off (default)	Disables the LIN2 transceiver

J20 – LIN2 master selection

Jumper Setting	Effect
On	LIN2 is configured as a master node
Off (default)	LIN2 is configured as a slave node

J21 – LIN2 pin1 configuration

Jumper Setting	Effect
On	Pin 1 of the LIN2 connector is connected to 12V
Off (default)	Pin 1 of the LIN2 connector is not connected to 12V

J29 – LIN2/SCI TxD selection

Controls whether the TxD pin on LIN2 or SCI is connected to the default I/O pin on the SPC560Bx processor.

Jumper Setting	Effect
1+2	The LIN2 TxD pin is connected to the “PC6” pin on the SPC560Bx processor. This should be set if enabling LIN2.
2+3	The SCI TxD pin is connected to the “PC6” pin on the SPC560Bx processor.

J30 – LIN2/SCI RxD selection

Controls whether the RxD pin on LIN2 or SCI is connected to the default I/O pin on the SPC560Bx processor.

Jumper Setting	Effect
1+2	The LIN2 RxD pin is connected to the “PC7” pin on the SPC560Bx processor. This should be set if enabling LIN2.
2+3	The SCI RxD pin is connected to the “PC7” pin on the SPC560Bx processor.

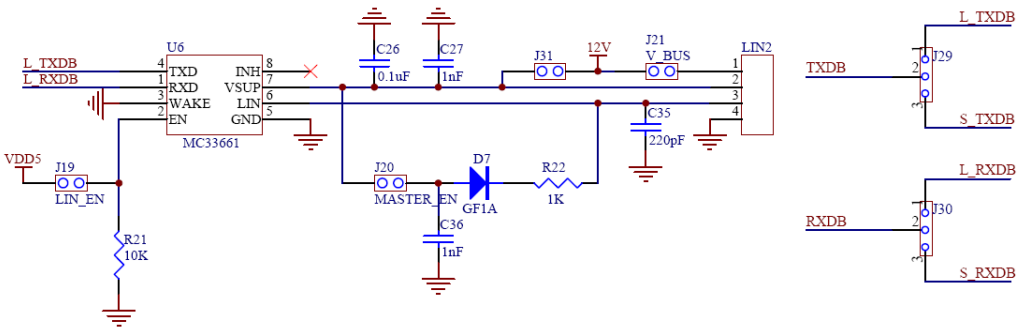

Figure 3-5: LIN2 schematic (Not populated by default)

3.5 SCI

One SCI interface is available on the SPC56XXMB.

J16 – SCI TxD Enable

Jumper Setting	Effect
On (default)	Enables SCI transmit
Off	Disables SCI transmit

J17 – SCI RxD Enable

Jumper Setting	Effect
On (default)	Enables SCI receive
Off	Disables SCI receive

J27 – LIN1/SCI TxD selection

Controls whether the TxD pin on LIN1 or SCI is connected to the default I/O pin on the SPC560Bx processor.

Jumper Setting	Effect
1+2	The LIN1 TxD pin is connected to the “PB2” pin on the SPC560Bx processor.
2+3	The SCI TxD pin is connected to the “PB2” pin on the SPC560Bx processor. This should be set if enabling SCI.

J28 – LIN1/SCI RxD selection

Controls whether the RxD pin on LIN1 or SCI is connected to the default I/O pin on the SPC560Bx processor.

Jumper Setting	Effect
1+2	The LIN1 RxD pin is connected to the “PB3” pin on the SPC560Bx processor.
2+3	The SCI RxD pin is connected to the “PB3” pin on the SPC560Bx processor. This should be set if enabling SCI.

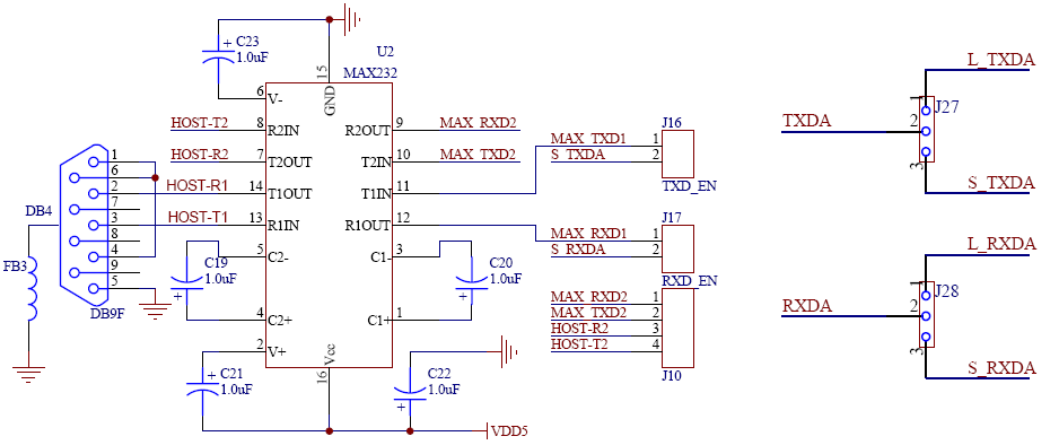

Figure 3-6: SCI schematic

3.6 CAN

Two CAN interfaces are implemented on the SPC56XXMB: a high-speed CAN interface and a low-speed CAN interface.

J14 – CAN (H) Transmit Enable

Jumper Setting	Effect
On	Enables CAN transmission
Off (default)	Disables CAN transmission

J15 – CAN (H) TxD/RxD Enable

Controls which I/O pins on the SPC560Bx processor are connected to the TxD and RxD pins on CAN (H).

Jumper Setting	Effect
1+3 (default)	The RxD pin of the CAN (H) interface is connected to the “PB1” pin of the SPC560Bx processor.
3+5	The RxD pin of the CAN (H) interface is connected to the “PC11” pin of the SPC560Bx processor.
2+4 (default)	The TxD pin of the CAN (H) interface is connected to the “PB0” pin of the SPC560Bx processor.
4+6	The TxD pin of the CAN (H) interface is connected to the “PC10” pin of the SPC560Bx processor.

J13 – CAN (L) CTE

Jumper Setting	Effect
On	Enables CAN transmission

Off (default)	Disables CAN transmission

J11 – CAN (L) TxD/RxD Enable

Controls which I/O pins on the SPC560Bx processor are connected to the TxD and RxD pins on CAN (L).

Jumper Setting	Effect
1+3	The RxD pin of the CAN (L) interface is connected to the “PB1” pin of the SPC560Bx processor.
3+5 (default)	The RxD pin of the CAN (L) interface is connected to the “PC11” pin of the SPC560Bx processor.
2+4	The TxD pin of the CAN (L) interface is connected to the “PB0” pin of the SPC560Bx processor.
4+6 (default)	The TxD pin of the CAN (L) interface is connected to the “PC10” pin of the SPC560Bx processor.

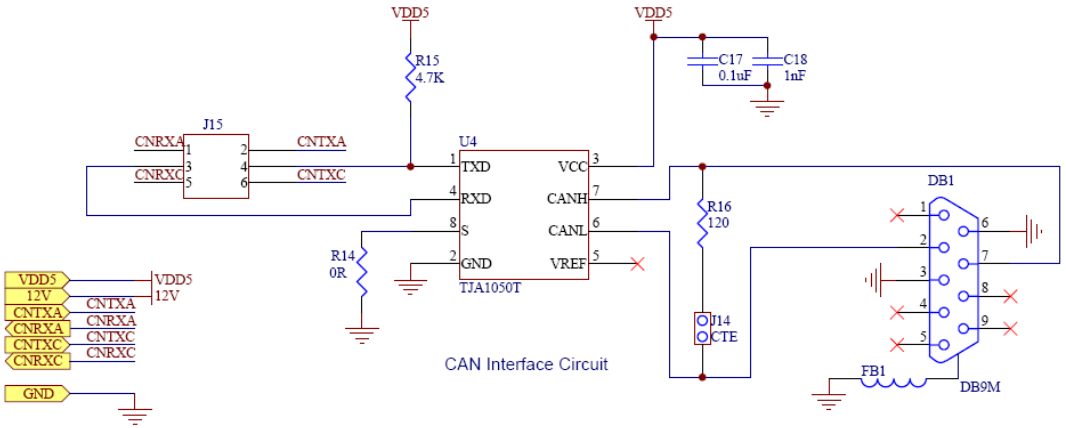

Figure 3-7: High Speed CAN schematic

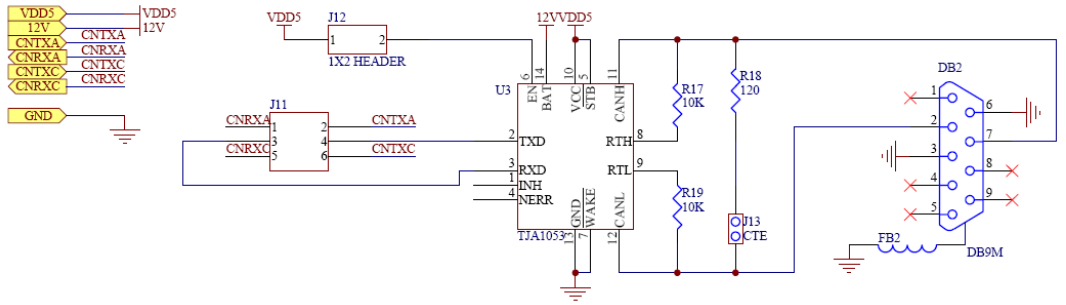

Figure 3-8: Low Speed CAN schematic

3.7 Potentiometer

A potentiometer is available on the SPC56XXMB to allow an analog voltage input.

J18 – POT Enable

Jumper Setting	Effect

On (default)	The potentiometer wiper terminal is connected to the “PB0” pin on the SPC560Bx processor.
Off	The potentiometer wiper terminal is left disconnected.

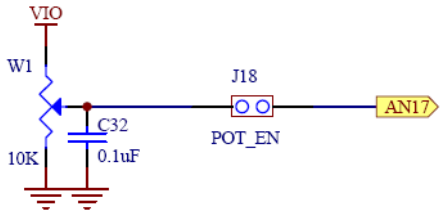

Figure 3-9: Potentiometer schematic

3.8 Pin Mapping

The following is the SPC560Bx EVB pin assignment for the Pin Array headers:

PJ1

RESET	RSTOUT
CNRX0 - PB1	CNRX1 - PC11
CNTX0 - PB0	CNTX1 - PC10
SIN0 - PA12	SOUT0 - PA13
SCK0 - PA14	PCS0.0 - PA15
PCS0.1 - PC3	PCS0.2 - PE15
RXD0 - PB3	TXD0 - PB2
RXD1 - PC7	TXD1 - PC6
GND	5V

PJ2

FAB - PA9	ABS0 - PA8
X	X
X	X
X	X
X	X
X	X
X	X
X	X
GND	5V

PJ4 - Nexus

MCKO	EVTO
MSEO0	EVTI
X	TDO
MDO0	TDI
MDO1	TCK
MDO2	TMS
MDO3	X
X	X
GND	5V

PJ7 - Port A

PA0	PA1
PA2	PA3
PA4	PA5
PA6	PA7
PA8	PA9
PA10	PA11
PA12	PA13
PA14	PA15
X	X

PJ5 - Port B

PB0	PB1
PB2	PB3
PB4	PB5
PB6	PB7
PB8	PB9
PB10	PB11
PB12	PB13
PB14	PB15
GND	5V

PJ6 - Port C

PC0	PC1
PC2	PC3
PC4	PC5
PC6	PC7
PC8	PC9
PC10	PC11
PC12	PC13
PC14	PC15
GND	5V

PJ3 - Port D

PD0	PD1
PD2	PD3
PD4	PD5
PD6	PD7
PD8	PD9
PD10	PD11
PD12	PD13
PD14	PD15
GND	5V

PJ8 - Port E

PE0	PE1
PE2	PE3
PE4	PE5
PE6	PE7
PE8	PE9
PE10	PE12
PE11	PE13
PE14	PE15
GND	5V

PJ9 - Port F

GND	PF14	PF12	PF10	PF8	PF6	PF4	PF2	PF0
5V	PF15	PF13	PF11	PF9	PF7	PF5	PF3	PF1

PJ10 - Port G

GND	PG14	PG12	PG10	PG8	PG6	PG4	PG2	PG0
5V	PG15	PG13	PG11	PG9	PG7	PG5	PG3	PG1

PJ11 - Port H

GND	PH14	PH12	PH10	PH8	PH6	PH4	PH2	PH0
5V	PH15	PH13	PH11	PH9	PH7	PH5	PH3	PH1

Figure 3-10: Pin Mapping

4 SPC560BxADPT100S HARDWARE & JUMPER SETTINGS

4.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

J7 – FAB Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

Jumper Setting	Effect
1+2	The SPC560Bx processor uses serial boot mode
2+3 (default)	The SPC560Bx processor uses internal boot mode

J8 – ABS Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

Jumper Setting	Effect
1+2	The SPC560Bx processor uses the CAN interface for serial boot mode
2+3 (default)	The SPC560Bx processor uses the UART interface for serial boot mode

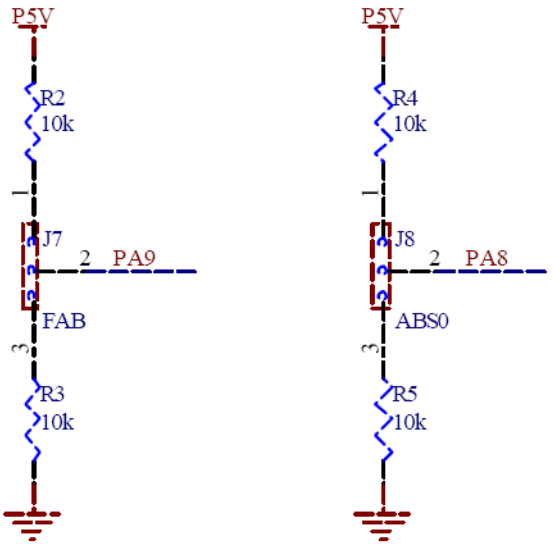

Figure 4-1: Boot Configuration Jumpers

4.2 Power Configuration

When the SPC560Bx Mini-Module is plugged into the SPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the SPC560Bx Mini-Module is used as a stand-alone board, an external 5V power supply must be used.

The following jumpers affect the power supply pins of the SPC560Bx processor:

J14 – Digital Supply Input Enable

Controls whether power is provided to the “Digital Supply Input” pins (VDD_HV) on the SPC560Bx processor.

Jumper Setting	Effect

On (default)	SPC560Bx Digital Supply Input pins are connected to 5V
Off	SPC560Bx Digital Supply Input pins are unpowered

J15 – 1.2V Decoupling Pins Configuration

Controls whether the 1.2V decoupling pins (VDD_LV) on the SPC560Bx processor are connected to 1.2V power.

Jumper Setting	Effect
On	SPC560Bx 1.2V decoupling pins are connected to 1.2V
Off (default)	SPC560Bx 1.2V decoupling pins are connected only to decoupling capacitors

J16 – Internal Regulator Supply Configuration

Controls whether the “internal regulator supply” pin (VDD_BV) on the SPC560Bx processor are connected to 5V power.

Jumper Setting	Effect
1+2 (default)	SPC560Bx internal regulator supply pin is connected to 5V
2+3	SPC560Bx internal regulator supply pin is connected to GND

4.3 System Clock Configuration

The SPC560Bx Mini-Modules support the usage of crystal clock sources as well as external clock sources.

J3 – 32KHz Clock Enable

Both of the jumpers below need to be installed to enable the 32 KHz crystal clock source

Jumper Setting	Effect
1+2 (default)	The SPC560Bx “OSC32K_EXTAL” signal is connected to the 32KHz crystal clock source on the SPC560Bx Mini-Module
3+4 (default)	The SPC560Bx “OSC32K_XTAL” signal is connected to the 32KHz crystal clock source on the SPC560Bx Mini-Module

J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock

source.

Jumper Setting	Effect
1+2 (default)	The SPC560Bx “EXTAL” signal is connected to the crystal clock source on the SPC560Bx Mini-Module
3+4 (default)	The SPC560Bx “XTAL” signal is connected to the crystal clock source on the SPC560Bx Mini-Module

J11 – External clock source enable

The SPC560Bx Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

Jumper Setting	Effect
On	The SPC560Bx “EXTAL” signal is connected to the SMA connector on the SPC560Bx Mini-Module
Off (default)	The SMA connector on the SPC560Bx Mini-Module is disconnected from the processor

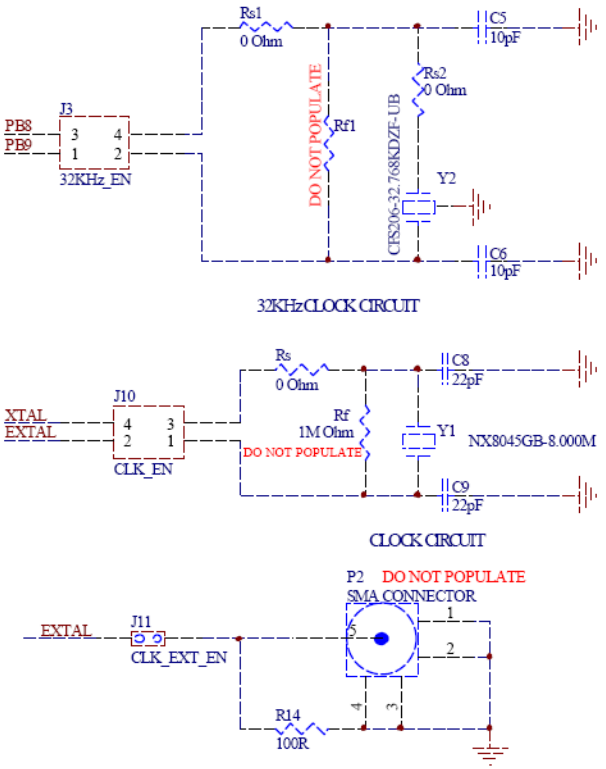

Figure 4-2: System Clock schematic

4.4 General Configuration

J13 – Reset Enable

A RESET push button on the SPC560Bx Mini-Module can be used to reset the processor.

Jumper Setting	Effect
On (default)	The RESET button on the SPC560Bx Mini-Module is enabled

Off	The RESET button on the SPC560Bx Mini-Module is disabled

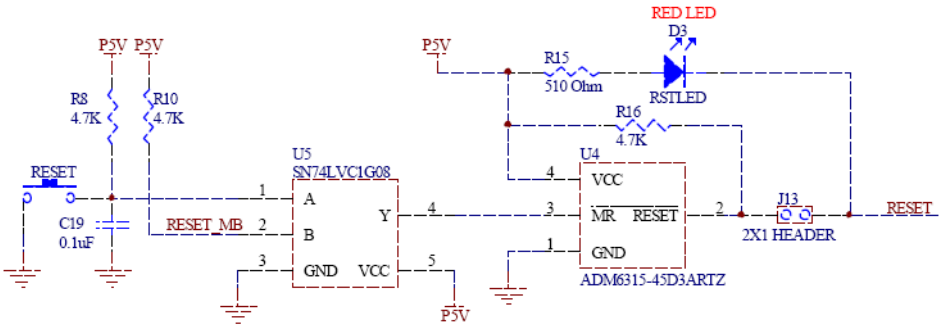

Figure 4-3: Reset circuitry schematic

5 SPC560BxADPT144S HARDWARE & JUMPER SETTINGS

5.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

J7 – FAB Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

Jumper Setting	Effect
1+2	The SPC560Bx processor uses serial boot mode
2+3 (default)	The SPC560Bx processor uses internal boot mode

J8 – ABS Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

Jumper Setting	Effect
1+2	The SPC560Bx processor uses the CAN interface for serial boot mode
2+3 (default)	The SPC560Bx processor uses the UART interface for serial boot mode

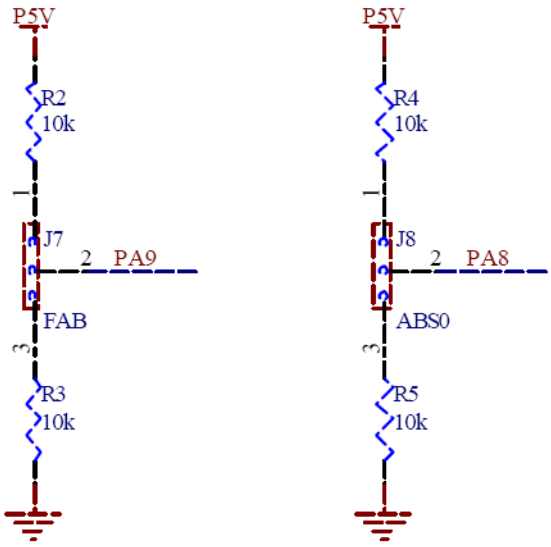

Figure 5-1: Boot Configuration Jumpers

5.2 Power Configuration

When the SPC560Bx Mini-Module is plugged into the SPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the SPC560Bx Mini-Module is used as a stand-alone board, an external 5V power supply must be used.

The following jumpers affect the power supply pins of the SPC560Bx processor:

J14 – Digital Supply Input Enable

Controls whether power is provided to the “Digital Supply Input” pins (VDD_HV) on the SPC560Bx processor.

Jumper Setting	Effect

On (default)	SPC560Bx Digital Supply Input pins are connected to 5V
Off	SPC560Bx Digital Supply Input pins are unpowered

J15 – 1.2V Decoupling Pins Configuration

Controls whether the 1.2V decoupling pins (VDD_LV) on the SPC560Bx processor are connected to 1.2V power.

Jumper Setting	Effect
On	SPC560Bx 1.2V decoupling pins are connected to 1.2V
Off (default)	SPC560Bx 1.2V decoupling pins are connected only to decoupling capacitors

J16 – Internal Regulator Supply Configuration

Controls whether the “internal regulator supply” pin (VDD_BV) on the SPC560Bx processor are connected to 5V power.

Jumper Setting	Effect
1+2 (default)	SPC560Bx internal regulator supply pin is connected to 5V
2+3	SPC560Bx internal regulator supply pin is connected to GND

5.3 System Clock Configuration

The SPC560Bx Mini-Modules support the usage of crystal clock sources as well as external clock sources.

J3 – 32KHz Clock Enable

Both of the jumpers below need to be installed to enable the 32 KHz crystal clock source

Jumper Setting	Effect
1+2 (default)	The SPC560Bx “OSC32K_EXTAL” signal is connected to the 32KHz crystal clock source on the SPC560Bx Mini-Module
3+4 (default)	The SPC560Bx “OSC32K_XTAL” signal is connected to the 32KHz crystal clock source on the SPC560Bx Mini-Module

J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

Jumper Setting	Effect
1+2 (default)	The SPC560Bx “EXTAL” signal is connected to the crystal clock source on the SPC560Bx Mini-Module
3+4 (default)	The SPC560Bx “XTAL” signal is connected to the crystal clock source on the SPC560Bx Mini-Module

J11 – External clock source enable

The SPC560Bx Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

Jumper Setting	Effect
On	The SPC560Bx “EXTAL” signal is connected to the SMA connector on the SPC560Bx Mini-Module
Off (default)	The SMA connector on the SPC560Bx Mini-Module is disconnected from the processor

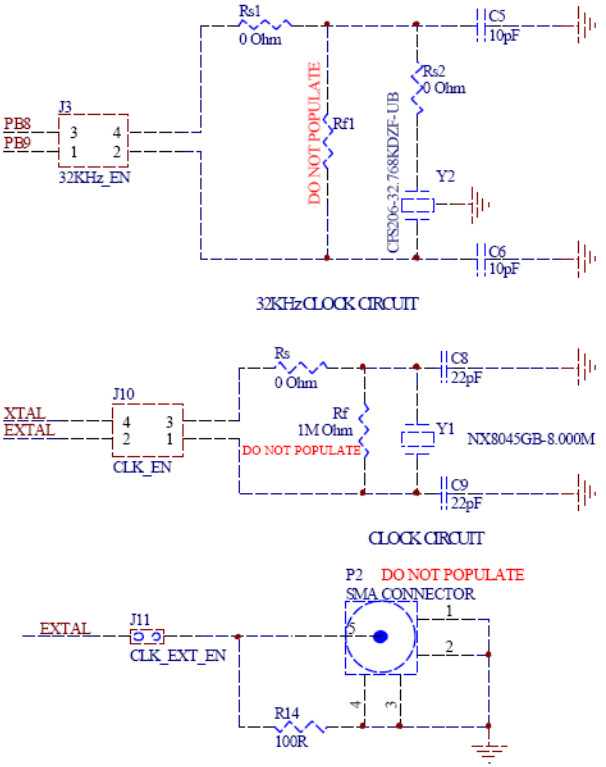

Figure 5-2: System Clock schematic

5.4 General Configuration

J13 – Reset Enable

A RESET push button on the SPC560Bx Mini-Module can be used to reset the processor.

Jumper Setting	Effect
On (default)	The RESET button on the SPC560Bx Mini-Module is enabled
Off	The RESET button on the SPC560Bx Mini-Module is disabled

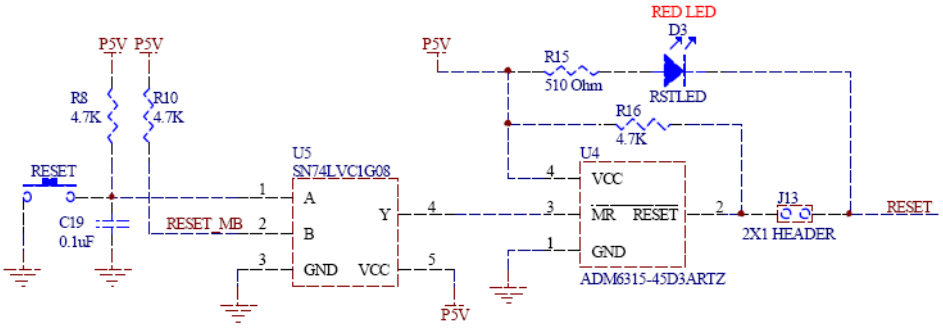

Figure 5-3: Reset circuitry schematic

6 SPC560BxADPT208S HARDWARE & JUMPER SETTINGS

6.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

J7 – FAB Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

Jumper Setting	Effect
1+2	The SPC560Bx processor uses serial boot mode
2+3 (default)	The SPC560Bx processor uses internal boot mode

J8 – ABS Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

Jumper Setting	Effect
1+2	The SPC560Bx processor uses the CAN interface for serial boot mode
2+3 (default)	The SPC560Bx processor uses the UART interface for serial boot mode

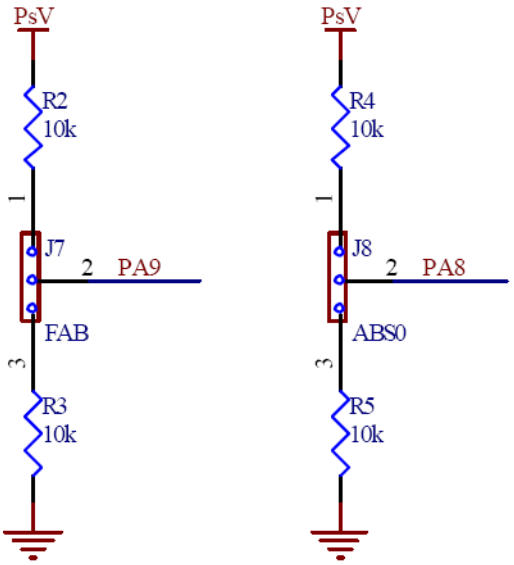

Figure 6-1: Boot Configuration Jumpers

6.2 Power Configuration

When the SPC560Bx Mini-Module is plugged into the SPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the SPC560Bx Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. The SPC560BxADPT208S is the only SPC560Bx Mini-Module that is able to accept both 5V and 3.3V for input power when used as a stand-alone board.

The following jumpers affect the power supply pins of the SPC560Bx processor:

J4 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to

communicate with the processor.

Jumper Setting	Effect
1+2 (default)	Debug port(s) are configured for 5V logic
2+3	Debug port(s) are configured for 3.3V logic

J14 – Digital Supply Input Enable

Controls whether power is provided to the “Digital Supply Input” pins (VDD_HV - pins C2, E16, G13, H3, R5) on the SPC560Bx processor.

Jumper Setting	Effect
On (default)	SPC560Bx Digital Supply Input pins are connected to 3.3V or 5V (determined by J19)
Off	SPC560Bx Digital Supply Input pins are unpowered

J15 – Digital Supply Input OSC0REG0 Enable

Controls whether power is provided to the “Digital Supply Input” pins (VDD_HV, pin N9) on the SPC560Bx processor.

Jumper Setting	Effect
On (default)	SPC560Bx Digital Supply Input pin N9 is connected to 3.3V or 5V (determined by J19)
Off	SPC560Bx Digital Supply Input pin N9 is unpowered

J16 – Digital Supply Input FLA0 Enable

Controls whether power is provided to the “Digital Supply Input” pins (VDD_HV – pin D9) on the SPC560Bx processor.

Jumper Setting	Effect
1+2 (default)	SPC560Bx Digital Supply Input pin D9 is connected to 3.3V or 5V (determined by J19)
2+3	SPC560Bx Digital Supply Input pin D9 is connected to GND

J17 – ADC Analog Supply Voltage Enable

Controls whether the reference voltage and analog supply pin for the A/D converter (VDD_HV_ADC, pin P14) is powered.

Jumper Setting	Effect
On (default)	SPC560Bx ADC supply pin P14 is connected to 3.3V or 5V (determined by J19)
Off	SPC560Bx Digital Supply Input pin D9 is unpowered

J18 – 1.2V Decoupling Pins Configuration

Controls whether the 1.2V decoupling pins (VDD_LV) on the SPC560Bx processor are connected to 1.2V power.

Jumper Setting	Effect

On	SPC560Bx 1.2V decoupling pins are connected to 1.2V
Off (default)	SPC560Bx 1.2V decoupling pins are connected only to decoupling capacitors

J19 – Power Supply Voltage Selection

Controls whether the processor is powered using 5V or 3.3V. This selection can only be made if the SPC560Bx Mini-Module is plugged into the SPC56XXMB motherboard. If the SPC560Bx Mini-Module is used as a stand-alone board, the processor is powered directly by the external power supply and this jumper setting has no effect.

Jumper Setting	Effect
1+2 (default)	SPC560Bx processor is powered by the 5V supply
2+3	SPC560Bx processor is powered by the 3.3V supply

J20 – Internal Regulator Supply Configuration

Controls whether the “internal regulator supply” pin (VDD_BV) on the SPC560Bx processor is powered.

Jumper Setting	Effect
1+2 (default)	SPC560Bx internal regulator supply pin is connected to 5V or 3.3V (determined by J19)
2+3	SPC560Bx internal regulator supply pin is connected to GND

6.3 System Clock Configuration

The SPC560Bx Mini-Modules support the usage of crystal clock sources as well as external clock sources.

J3 – 32KHz Clock Enable

Both of the jumpers below need to be installed to enable the 32 KHz crystal clock source

Jumper Setting	Effect
1+2 (default)	The SPC560Bx “OSC32K_XTAL” signal is connected to the 32KHz crystal clock source on the SPC560Bx Mini-Module
3+4 (default)	The SPC560Bx “OSC32K_EXTAL” signal is connected to the 32KHz crystal clock source on the SPC560Bx Mini-Module

J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

Jumper Setting	Effect
1+2 (default)	The SPC560Bx “EXTAL” signal is connected to the crystal clock source on the SPC560Bx Mini-Module
3+4 (default)	The SPC560Bx “XTAL” signal is connected to the crystal clock source on the SPC560Bx Mini-Module

J11 – External clock source enable

The SPC560Bx Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

Jumper Setting	Effect
On	The SPC560Bx “EXTAL” signal is connected to the SMA connector on the SPC560Bx Mini-Module
Off (default)	The SMA connector on the SPC560Bx Mini-Module is disconnected from the processor

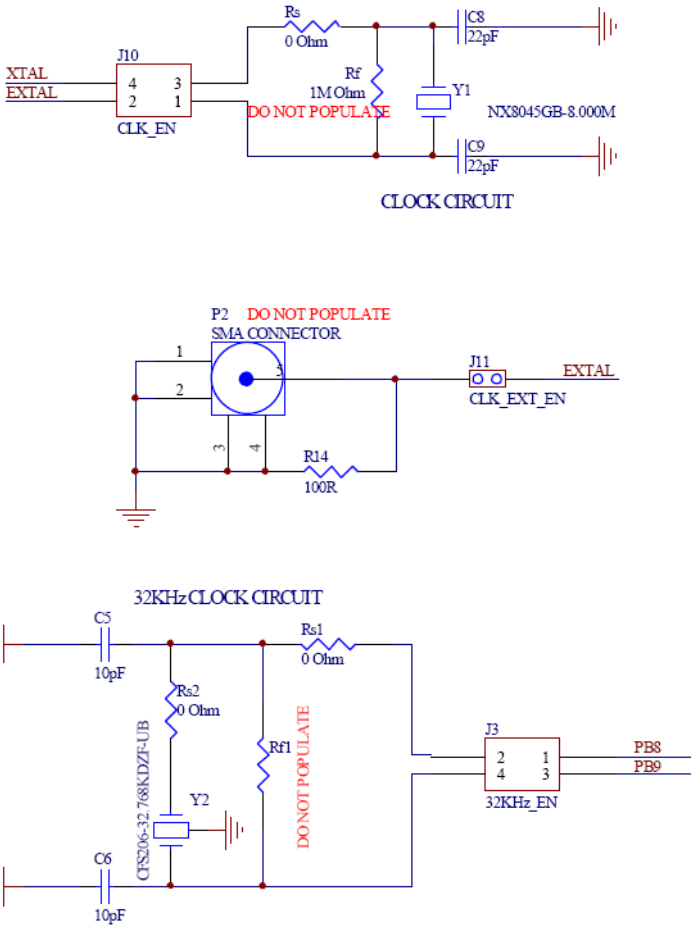

Figure 6-2: System Clock schematic

6.4 General Configuration

J13 – Reset Enable

A RESET push button on the SPC560Bx Mini-Module can be used to reset

the processor.

Jumper Setting	Effect
On (default)	The RESET button on the SPC560Bx Mini-Module is enabled
Off	The RESET button on the SPC560Bx Mini-Module is disabled

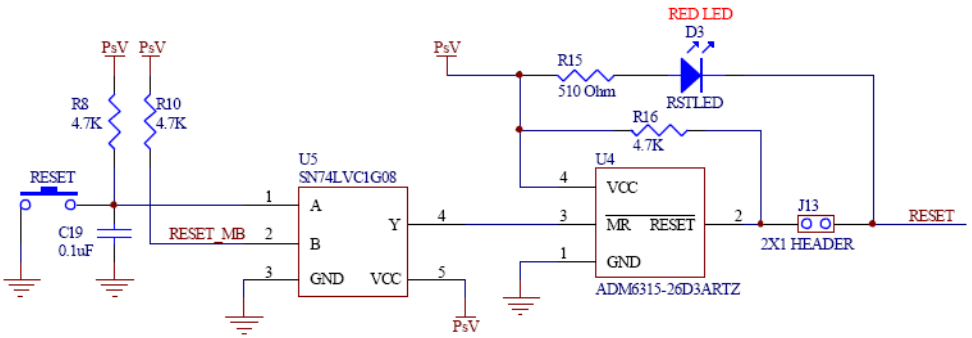

Figure 6-3: Reset circuitry schematic

7 DEBUGGING/PROGRAMMING THE SPC560Bx EVB

P&E provides hardware and software tools for debugging and programming the SPC560Bx EVB system.

P&E's USB-ML-PPCNEXUS and Cyclone MAX offer two effective hardware solutions, depending on your needs. The USB-ML-PPCNEXUS is a development tool that will enable you to debug your code and program it onto your target. The Cyclone MAX is a more versatile and robust development tool with advanced features and production programming capabilities, as well as Ethernet support.

More information is available below to assist you in choosing the appropriate development tool for your needs.

7.1 Hardware Solutions At A Glance

The USB-ML-PPCNEXUS offers an affordable and compact solution for your development needs, and allows debugging and programming to be accomplished simply and efficiently. Those doing rapid development will find the USB-ML-PPCNEXUS easy to use and fully capable of fast-paced debugging and programming.

The Cyclone MAX is a more complete solution designed for both development and production. The Cyclone MAX features multiple communications interfaces (including USB, Ethernet, and Serial), stand-alone programming functionality, high speed data transfer, a status LCD, and many other advanced capabilities.

Below is an overview of the features and intended use of the USB-ML-PPCNEXUS and Cyclone MAX.

7.1.1 USB-ML-PPCNEXUS Key Features

- Programming and debugging capabilities
- Compact and lightweight
- Communication via USB 2.0
- Supported by P&E software

7.1.2 Cyclone MAX Key Features

- Advanced programming and debugging capabilities, including:

- PC-Controlled and User-Controlled Stand-Alone Operation
- Interactive Programming via Host PC
- In-Circuit Debugging, Programming, and Testing
- Supports STMicroelectronics' SPC56xx microcontrollers
- Communication via USB, Serial, and Ethernet Ports
- Multiple image storage
- LCD screen menu interface
- Supported by P&E software
- Works With P&E's USB-ML-PPCNEXUS

7.2 Working With P&E's USB-ML-PPCNEXUS

Figure 7-1: P&E's USB-ML-PPCNEXUS

7.2.1 Product Features & Implementation

P&E's USB-ML-PPCNEXUS Interface (USB-ML-PPCNEXUS) connects your target to your PC and allows the PC access to the debug mode on STMicroelectronics' SPC56xx microcontrollers. It connects between a USB port on a Windows 2000/XP/2003/Vista machine and a standard 14-pin JTAG/ Nexus connector on the target.

By using the USB-ML-PPCNEXUS Interface, the user can take advantage of the background debug mode to halt normal processor execution and use a PC to control the processor. The user can then directly control the target's execution, read/write registers and memory values, debug code on the processor, and program internal or external FLASH memory devices. The USB-ML-PPCNEXUS enables you to debug, program, and test your code on your board.

7.2.2 Software

The USB-ML-PPCNEXUS Interface works with P&E's in-circuit debugger and flash programmer to allow debug and flash programming of the target processor. P&E's USB-ML-PPCNEXUS Development Packages come with the USB-ML-PPCNEXUS Interface, as well as flash programming software, in-circuit debugging software, Windows IDE, and register file editor.

7.3 Working With P&E's Cyclone MAX

Figure 7-2: P&E's Cyclone MAX

7.3.1 Product Features & Implementation

P&E's Cyclone MAX is an extremely flexible tool designed for debugging, testing, and in-circuit flash programming of STMicroelectronics' SPC56xx microcontrollers. The Cyclone MAX connects your target to the PC via USB, Ethernet, or Serial Port and enables you to debug your code, program, and test it on your board. After development is complete the Cyclone MAX can be used as a production tool on your manufacturing floor.

For production, the Cyclone MAX may be operated interactively via Windows-based programming applications as well as under batch or .dll commands from a PC. Once loaded with data by a PC it can be disconnected and operated manually in a stand-alone mode via the LCD menu and control buttons. The Cyclone MAX has over 3Mbytes of non-volatile memory, which allows the on-board storage of multiple programming images. When connected to a PC for programming or loading it can communicate via the Ethernet, USB, or serial interfaces.

7.3.2 Software

The Cyclone MAX comes with intuitive configuration software and interactive

programming software, as well as easy to use automated control software. The Cyclone MAX also functions as a full-featured debug interface, and is supported by development software from P&E.

P&E's Cyclone MAX is also available bundled with additional software as part of various Development Packages. In addition to the Cyclone MAX, these Development Packages include in-circuit debugging software, flash programming software, a Windows IDE, and register file editor.

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